

IN THE CLAIMS

Please amend the claims as follows:

1. (Currently Amended) A simulation method for simulating a behavior of a mechanism of a mechanical device ~~that is~~ using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software using a hybrid model of the mechanical device, the hybrid model including a state transition model and a continuous system model, the method comprising:

inputting hybrid model description data representing the hybrid model;

analyzing the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

generating a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data;

generating a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data;

~~generating a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data;~~

starting a simulation of the mechanism after completion of generating the table and generating the internal data expressions;

selecting an active continuous system equation by looking up the table according to an occurrence of an event; and

outputting data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using the internal data expressions that correspond to the selected active continuous system equation, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.

2. (Previously Presented) The method according to claim 1, further comprising:
switching the active one of the continuous system equations to another continuous system equation by operating a flag assured for each of the continuous system equations.

3. (Previously Presented) The method according to claim 1, wherein the event is responsive to one of the signal and an evaluation result of an internal variable.

4. (Original) The method according to claim 1, further comprising executing a kinematics simulation which uses the data that represents the behavior of the mechanism.

5. (Canceled).

6. (Currently Amended) A simulation method for simulating a behavior of a mechanism of a mechanical device ~~that is~~ using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software using a hybrid model of the mechanical device, the hybrid model including a state transition model and a continuous system model, the method comprising:

inputting hybrid model description data representing the hybrid model;

analyzing the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

generating a first program code based on the extracted first description data;

generating a second program code based on the extracted second description data;

generating a plurality of internal data expressions of all continuous system equations including the simultaneous equations by executing the second program;

starting a simulation of the mechanism after completion of the steps of generating the first program code, the second program code, and the internal data expressions;

switching continuous system equations according to a table representing a relationship between the internal data expressions of all continuous system equations and switching conditions thereof by executing the first program; and

outputting data that represents the behavior of the mechanism by solving the continuous system equations by numerical integration using the internal data expressions, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.

7. (Currently Amended) A simulation apparatus which includes a processor and simulates a behavior of a mechanism of a mechanical device that is using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software using a hybrid model of the mechanical device, the hybrid model including a state transition model and a continuous system model, comprising:

an input unit configured to input hybrid model description data representing the hybrid model;

an analyzing unit configured to analyze the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

a first generating unit configured to generate a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data;

a ~~first~~ second generating unit configured to generate a table representing a relationship between the internal data expressions of the continuous system equations including the simultaneous equations and switching conditions thereof, based on the extracted first description data;

~~a second generating unit configured to generate a plurality of internal data expressions of all the continuous system equations, based on the extracted second description data; and~~

a simulation execution unit configured to:

start a simulation of the mechanism after generating the table and the internal data expressions;

select an active continuous system equation by looking up the table according to an occurrence of an event; and

output data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using one or more of the internal data expressions that corresponds to the selected active continuous system equation, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.

8. (Original) The apparatus according to claim 7, wherein the simulation execution unit switches an active one of the continuous system equations to another continuous system equation by operating a flag assured for each of the continuous system equations.

9. (Previously Presented) The apparatus according to claim 7, wherein the event is responsive to one of the control signal and an evaluation result of an internal variable.

10. (Original) The apparatus according to claim 7, further comprising a kinematics simulation execution unit configured to execute a kinematics simulation which uses the data that represents the behavior of the mechanism.

11. (Canceled)

12. (Currently Amended) A simulation apparatus which includes a processor and simulates a behavior of a mechanism of a mechanical device that is using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software using a hybrid model of the mechanical device, the hybrid model including a state transition model and a continuous system model, comprising:

an input unit configured to input hybrid model description data representing the hybrid model;

an analyzing unit configured to analyze the hybrid model to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

a first generating unit configured to generate a first program code based on the extracted first description data;

a second generating unit configured to generate a second program code based on the extracted second description data;

a third generating unit configured to generate a plurality of internal data expressions of all continuous system equations including the simultaneous equations by executing the second program;

a simulation execution unit configured to:

start a simulation of the mechanism after generating the first program code, the second program code, and the internal data expressions;

switch continuous system equations according to a table representing a relationship between the internal data expressions of all continuous system equations and switching conditions thereof by executing the first program; and

an outputting unit configured to output data that represents the behavior of the mechanism by solving the continuous system equations by numerical integration using the internal data expressions, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.

13. (Currently Amended) A computer program stored in a computer readable medium for simulating a behavior of a mechanism of a mechanical device ~~that is~~ using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software ~~using a hybrid model of the mechanical device~~, the hybrid model including a state transition model and a continuous system model, the program comprising:

means for instructing a computer to input hybrid model description data representing the hybrid model;

means for instructing the computer to analyze the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

means for instructing the computer to generate a plurality of internal data expressions of all the continuous system equations including the simultaneous equations, based on the extracted second description data;

means for instructing the computer to generate a table representing a relationship between the internal data expressions of the continuous system equations and switching conditions thereof, based on the extracted first description data;

~~means for instructing the computer to generate a plurality of internal data expressions of all the continuous system equations including the simultaneous equations, based on the extracted second description data; and~~

means for instructing the computer to start a simulation of the mechanism after generating the table and the internal data expressions;

means for instructing the computer to select an active continuous system equation by looking up the table according to an occurrence of an event; and

means for instructing the computer to output data that represents the behavior of the mechanism by solving the selected active continuous system equation by numerical integration using the internal data expression that corresponds to the selected active continuous system equation, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.

14. (Original) The program according to claim 13, further comprising means for instructing the computer to switch an active one of the continuous system equations to

another continuous system equation by operating a flag assured for each of the continuous system equations.

15. (Previously Presented) The program according to claim 13, wherein the event is responsive to one of the control signal and an evaluation result of an internal variable.

16. (Original) The program according to claim 13, further comprising means for instructing the computer to execute a kinematics simulation which uses the data that represents the behavior of the mechanism.

17. (Canceled).

18. (Currently Amended) A computer program stored in a computer readable medium for simulating a behavior of a mechanism of a mechanical device ~~that is~~ using a hybrid model of the mechanical device, the mechanical device being regulated by mechanism control software ~~using a hybrid model of the mechanical device~~, the hybrid model including a state transition model and a continuous system model, the program comprising:

means for instructing a computer to input hybrid model description data representing the hybrid model;

means for instructing the computer to analyze the hybrid model description data to extract first description data of the state transition model and second description data of the continuous system model, which is represented as simultaneous equations of ordinary differential equations and algebraic equations;

means for instructing the computer to generate a first program code based on the extracted first description data;

means for instructing the computer to generate a second program code based on the extracted second description data;

means for instructing the computer to generate a plurality of internal data expressions of all continuous system equations including the simultaneous equations by executing the second program;

means for instructing the computer to start a simulation of the mechanism after generating the first program code, the second program code, and the internal data expressions;

means for instructing the computer to switch continuous system equations according to a table representing a relationship between the internal data expressions of all continuous system equations and switching conditions thereof by executing the first program; and

means for instructing the computer to output data that represents the behavior of the mechanism by solving the continuous system equations by numerical integration using the internal data expressions, wherein the outputted data is supplied to the mechanism control software as a response to a control signal provided from the mechanism control software.